



Mixed-Fruit Jam

All fruit or just pulp fiction?

By all means, jam–bread is cuisine of nostalgia. That there must be jam lovers’ communities will hardly come as a surprise to many of us. In Greece, jams, known as glyko, are eaten by the spoonful from bowls, followed by a drink of water, then a drink of liqueur. They are delicacies that were once considered medicinal preparations. If only to remind ourselves, jams, preserves and marmalades are based on ancient techniques for preserving fruit. The interaction of the fruit, sugar, acid and pectin in the correct proportions has long been of primary concern. The right balance is what makes the mixture gel. But then, is the common gelling agent pectin used within limits in commercially sold jams? What is the actual fruit content in your favourite jam? Does it meet the basic requirements? What do we know about their acidity and how much preservatives do they need? Are there pesticide residues, or heavy metals such as arsenic, lead, copper, zinc and tin? What are the chances of microbiological contamination? This report is a firsthand study of 13 brands available with various retailers in India and while the high total sugar content of jams should make us wary of consuming them regularly, there are key parameters on which all the brands met the requirements set out by the national standards.

The comparative testing carried out in an NABL-accredited laboratory was mainly based on the Indian Standard IS: 5861: 1993 (specifications for jams, jellies and marmalades) and FSS Rules, 2011. The objective was to assess and evaluate the regular/most-selling variety/type of jams traded in the retail market in packaged condition. It may be noted that while fruit contents quantification method is yet to be established, there are other parameters that determine the quality of a good fruit jam.

Fruit jam is one of the processed foods that is consumed by a large chunk of the urban and semi-urban population; it is estimated that the normal one-



In the Rule Book

Fruit jam means the product prepared from sound, ripe, fresh, dehydrated, frozen or previously packed fruits including fruit juices, fruit pulp, fruit juice concentrate or dry fruit by boiling its pieces or pulp or puree with nutritive sweeteners – namely sugar, dextrose, invert sugar or liquid glucose – to a suitable consistency. It may be prepared from any of the suitable fruits, singly or in combination. It shall have the flavour of the original fruit(s) and shall be free from burnt or objectionable flavours and crystallization.

The product shall be manufactured from not less than 45 per cent, by weight, of original prepared fruit, exclusive of any added sugar or optional ingredients of finished product except where fruit is strawberry or raspberry, where it shall contain not less than 25 per cent fruit.

The preparation of mixed-fruit preserves traditionally involves the use of pectin as a gelling agent, although sugar or honey may be used as well. The fruits are heated with water and sugar to activate the pectin in the fruit. The mixture is then put into containers.

The fruits used in mixed-fruit jam usually vary. The common fruits include apples, papayas, oranges, pineapples and plums. Good mixed-fruit jam has a soft, even consistency without distinct pieces of fruit, a bright colour, a good fruit flavour and a semi-jellied texture that is easy to spread but has no free liquid. It is better to opt for organic varieties with low sugar content. They also have the added benefit of containing no added preservatives or flavours.



Comparative Test

time consumption by an individual touches about 40–50 gm (two tablespoons) among adults as well as children. It will help to remember that a large part of the intake is in the form of sugar, which is the major ingredient as per the test results as well as the label declaration. Therefore intake quantity has to be monitored while regularly consuming fruit jams.

CV Recommendation | Top Performer

Cremica

Value for Money

Cremica



BRANDS TESTED

We conducted a survey to locate the top-selling brands of mixed-fruit jams available in the retail markets. The 13 shortlisted brands went through a gamut of tests on parameters such as total soluble solids, fructose, sucrose, total sugar, carbohydrate, benzoic acid (preservative)

and pectin (gelling agent). The brands were further subjected to tests for presence of heavy metals (lead, arsenic, copper, zinc, tin) and pesticide residues, microbiological tests and sensory (organoleptic) tests.



Rank	Total Score out of 100 (Rounded off)	Brand	Pack quantity (gm)	MRP/Retail Price (Rs)	Best Before (Months)	Manufacturer/Marketer
1	86	Cremica	480	99/90	12	Mrs Bector's Food Specialities Ltd, Jalandhar, Punjab
2	85	Mapro	700	153 (Rs 33 off)	18	Mapro Foods Pvt. Ltd, Wai, Satara, Maharashtra
2	85	Mum's	500	140/140 (buy one, get one free)	18	Amrapali Biotech India Pvt. Ltd, Bihar
2	85	Tops	500	90/88	18	GD Foods Pvt. Ltd, Alwar, Rajasthan
3	84	Sil	500	107/107	18	Scandic Food India Pvt. Ltd, Saswad, Pune, Maharashtra
4	83	Mrs Food Rite	500	109/109	18	Radiant Indus Chem Pvt. Ltd, Aurangabad, Maharashtra
5	82	Easy Maxx	500	90/78	12	Bharti Retail Ltd, New Delhi
6	80	Druk	500	107/107	18	Tai Industries Ltd, Kolkata, West Bengal
7	79	Safal	500	95/85	12	Mother Dairy Fruit & Vegetable Pvt. Ltd, Delhi
8	78	Reliance Select	500	119/119	12	Reliance Retail Ltd, Thane, Maharashtra
8	78	Kissan	500	110/106 (art kit free)	12	Hindustan Unilever Ltd, Nashik, Maharashtra
9	77	Mala's	500	99/80	12	Mala's Fruit Products, Satara, Maharashtra
9	77	Tasty Treat	500	139/139 (buy one, get one free)	12	Indira Foods, Bengaluru, Karnataka

Comparative Test



KEY FINDINGS

- Based on the overall test findings, Cremica is the topper.
- Cremica is our choice for 'value for money' on the basis of its performance and cost (Rs 99/90 [MRP/retail price] per 480 gm).
- Cremica scored highest on the carbohydrate parameter.
- Cremica was found to have the lowest amount of total sugar (45.5 gm/100 gm) and this was close to the declared value of 45 gm.
- Highest fructose was found in Mapro and lowest in Kissan.
- Safal was found to have the highest amount of sucrose (41.53 gm/100 gm). The lowest levels were in Mum's, Sil, Tops, Easy Maxx, Mapro and Mrs Food Rite.
- The highest total soluble solids (TSS) was found in Sil and Reliance, and the lowest in Mrs Food Rite.
- Mala's topped in the overall sensory scores, followed by Cremica and Safal.
- It is clearly revealed from products' claims that they contain the maximum amount of sugar. Consumers are advised to consume jam in limited quantity depending upon their age.
- Mould count and yeast and spores count were within the specified limit in all the brands.
- Toxic metals such as lead and arsenic were not detected in any of the tested brands. There were slight traces of copper and zinc in all the brands. Tin was detected in negligible amount.
- No pesticide residue was detected in the tested brands.

TEST RESULTS

FOR PHYSICOCHEMICAL PARAMETERS

Total soluble solids | Fructose | Sucrose | Pectin
| Total sugar | Carbohydrate | Benzoic acid |
Acidity | L-Tartaric acid | Extraneous materials
| Total ash

◆ Total soluble solids

The total mass of a jam is made up of ingredients like sugar, fruit pulp, pectin, preservatives, salt, food colour and other soluble solids present naturally or

added in combining form. All of these make the 'total soluble contents' of a jam. High total soluble contents do not necessarily denote high fruit pulp since sugar, pectin and other preservatives also increase the amount of total soluble contents.

Indian Standard specifies that the total soluble solids (TSS) should be at least 68 per cent of the total weight. FSS Rules, 2011, specifies a requirement of not less than 65 per cent. Fruit content should not be less than 45 per cent. Basically, it is the fruit content and the quality of the fruit that determines the quality of the jam. It is not just fruit content that goes on to make a bottle of jam.

- Most of the tested brands kept their total soluble solids content near 65/68 per cent – the minimum requirement set by FSS Rules/Bureau of Indian Standards.
- The highest TSS was found in Sil and Reliance, and the lowest in Mrs Food Rite.

◆ Fructose

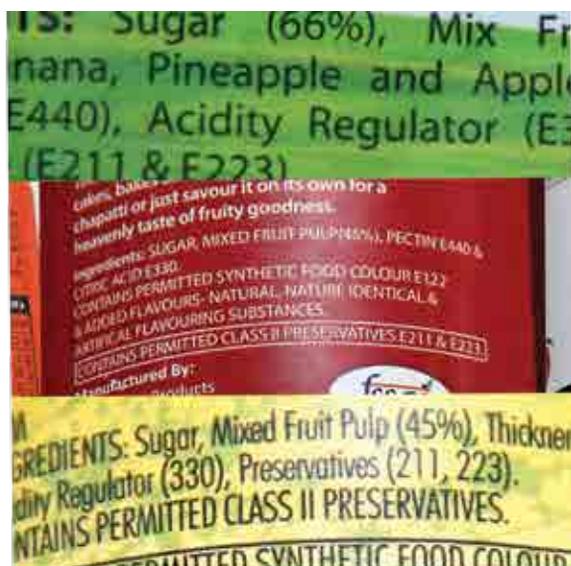
Fructose, also known as fruit sugar (levulose), is a simple sugar twice as sweet as sucrose (table sugar). Contrary to previous claims for its superiority over glucose (blood sugar), it does not play an essential part in human nutrition. It is naturally present in ripened fruits.

- Highest fructose was found in Mapro and lowest in Kissan.

◆ Sucrose

Sucrose is the sugar from sugar cane. There are three main sources of sucrose in our diet:

Check all food labels for the presence of sugars, syrup and other sucrose-containing foods. Avoid packaged foods with large amounts of added sugars. Ingredients on the food label are listed from the largest ingredient in the product to the smallest. Try to avoid large amounts of foods which include sugar (e.g., 'sugar' or 'raw sugar') listed as one of the first three ingredients.



- Table sugar we add ourselves (sprinkled on cereal or added in cooking)
 - Sucrose (table sugar) added by manufacturers to processed foods (cakes, biscuits, drinks, jams, canned fruits)
 - Natural sucrose found in fruits, vegetables, honey, etc.
- Safal was found to have the highest amount of sucrose (41.53 gm/100 gm). The lowest levels were in Mum's, Sil, Tops, Easy Maxx, Mapro and Mrs Food Rite.

◆ Pectin

The standards allow pectin content of one per cent maximum.

The most common gelling agent, pectin also causes jams to solidify. It is not desirable for jams to have high pectin content as pectin only substitutes fruit content, thus reducing value for money.

- All the tested brands were within the required limit.

Comparative Test



◆ Total sugar

Sugar is a combination of monosaccharides, glucose and fructose. This ingredient gives a natural taste and uniform texture to the product, in addition to thick density. It also acts as a preservative. We expect the quantity of sugar to be neither very high nor very low.

In the case of the jams we tested, the resulted value indicates the presence of total sugar in significant quantity. The declared values were closer to the values we arrived at.

- *Cremica was found to have the lowest amount of total sugar (45.5 gm/100 gm) and this was close to the declared value of 45 gm.*
- *Mala's was found to have the highest amount of total sugar (82.55 gm).*



Overall, it is clearly revealed from products' claims that they contain the maximum amount of sugar. Consumers are advised to consume jam in a limited quantity depending upon their age.

◆ Carbohydrate

Fruit jam is a source of carbohydrate. Carbohydrates are the body's main source of fuel. These raise your blood sugar more than any other nutrient. When you ingest any type of carbohydrates, they are broken down into glucose and it enters your bloodstream. The hormone insulin helps the cells in your body to take up this glucose and use it for energy.

- *Carbohydrate in the tested brands ranged from 52.76 per cent to 85.87 per cent.*
- *Cremica scored highest in this parameter, followed by Safal.*

◆ Benzoic acid

Benzoic acid is a common preservative and used in processed foods. The presence of preservative generally increases the shelf life of the product and prevents the deterioration of nutritional values, taste

Carbohydrate alert: High-carb foods should be evaluated to determine if they provide excess energy or 'empty' calories that the body will not use. After all, excess carbohydrates are turned into fat.

Do you know the foods high in carbs? Refined grains such as white rice are an example. These are not whole grains, as they have had most of the fibre, vitamins and minerals removed during processing. They provide calories with few, if any, nutrients.

What is neatly hidden and clustered under one head – Class II preservatives – in food labels is an array of substances like benzoic and tartaric acid. These acids are added to fruit juice to bring the pH level within the range that is necessary for jam-making. Benzoic acid is a common preservative usually added to prevent growth of moulds, yeast and other bacteria. Benzoic acid contributes to increased overall acidity of the product and people suffering from gastric or acidity problems would do well to keep away from processed foods that have high benzoic acid content. Jams fall in this category.

and odour as well as microbial contamination. However, an excess amount of preservative is not desirable. Indian standards allow for a maximum of 200 parts per million (ppm) of benzoic acid content in jams.

- All the tested brands were within the required limit.
- Kissan had the least amount of benzoic acid, followed by Tasty Treat and Druk.

◆ Acidity

- Mrs Food Rite was found to have the lowest acidity percentage (0.59), followed by Druk (0.62) and Safal (0.64).
- Easy Maxx (0.92) and Mapro (0.92) had the highest percentage of acidity.

◆ L-Tartaric acid

Tartaric acid is not an ingredient that you would generally find on your jam's label, but it is present in all jams. It is used as an additive in foods to make them taste sour. The national standards limit this ingredient to a maximum of 600 ppm.

- All the 13 brands were within the specified limit.
- Reliance Select scored highest in this parameter, followed by Cremica.

The concentration of total ash (gm/100gm) in the 13 brands was negligible. The ash content of a foodstuff is the residue remaining after all the moisture has been removed and the organic material has been burnt away by igniting at a temperature of about 550 degrees C. Residual sulphur dioxide and ascorbic acid were not detected in any of the tested brands. Extraneous vegetable materials were also absent.



PHYSICOCHEMICAL

Parameter ↓	Weightage (%)	Cremica	Mapro	Mum's	Tops	Sil	
Total soluble solids	12	9.84	9.3	10.02	9.66	10.92	
Fructose	10	7.95	9.98	9.53	9.66	9.48	
Sucrose	6	5.16	6	6	6	6	
Pectin	5	4.4	4.4	4.4	4.7	4.4	
Total sugar	4	3.97	2.71	2.59	2.65	2.44	
Carbohydrate	4	4	3.13	2.54	2.92	2.91	
Benzoic acid	4	1.07	1.57	1.67	1.09	1.6	
Acidity	3	2.66	2.33	2.78	2.71	2.51	
L-Tartaric acid	3	2.79	2.47	2.39	2.65	2.68	
Extraneous materials	3	3	3	3	3	3	
Total ash	3	2.73	2.73	2.82	2.64	2.46	



FOR MICROBIOLOGICAL ACTIVITY

Microbiological contamination is a critical factor in determining the quality of food products. Tests were conducted for mould count as well as yeast and spores count. These microorganisms are responsible for many food-borne diseases. Due to improper or poor manufacturing practices, microorganisms occur in the finished product.

As per the national standards (BIS and FSS Rules, 2011), the product: a) shall be free from microorganisms capable of development under normal conditions of storage, and b) shall not contain substances originating from microorganisms which may represent a hazard to health.

- *In the brands tested, mould count and yeast and spores count were not more than 10 cfu (colony-forming unit) per gram.*

FOR HEAVY METALS

Lead | Arsenic | Copper | Zinc | Tin

We tested the jam for presence of heavy metals such as arsenic, lead, copper, zinc and tin. Lead, a cumulative poison, enters either through the soil or during production. It accumulates in the body

SCORES

	Mrs Food Rite	Easy Maxx	Druk	Safal	Reliance Select	Kissan	Mala's	Tasty Treat
	8.88	8.94	9.48	9.48	10.92	9.6	9.48	10.38
	9.74	9.2	8.2	5.81	6.09	5.55	6.68	6.23
	6	6	5.72	2.22	2.52	3.13	2.94	2.77
	4.1	3.8	4.1	4.7	4.7	3.8	4.1	4.4
	2.78	2.77	2.68	2.68	2.92	2.66	1.81	2.53
	3.13	2.56	2.14	3.19	2.84	2.94	2.23	2.89
	1.21	1.27	1.73	1.51	1.48	2.26	1.56	1.82
	2.92	2.33	2.87	2.83	2.69	2.73	2.67	2.65
	2.31	2.8	2.66	2.36	2.84	2.35	2.49	2.4
	3	3	3	3	3	3	3	3
	2.46	2.64	2.37	2.91	2.64	2.79	2.46	2.28

Pesticide Residues

The 13 brands were tested for the presence of various pesticides including endosulphan (alpha), endosulphan (beta), lindane (gamma-HCH), diazinon, dichlorvos, ethion, fenitrothion, fenthion, phorate, phosalone, quinalphos and trizophos.

No pesticide residue was detected.

and causes irreversible damage to the brain, nerve cells, red blood cells and the kidneys. Ingestion of a large amount of arsenic can lead to gastrointestinal symptoms such as severe vomiting, high blood pressure, heart attack, etc.

- *Lead and arsenic were not detected in any of the tested brands. There were slight traces of copper and zinc in all the brands. Tin was detected in negligible amount*

FOR SENSORY ATTRIBUTES

Sensory tests were conducted in the food and nutrition department of a reputed college of Delhi University. A group of postgraduate students participated under the guidance/supervision of professors and technical experts. The panellists judged the following parameters on a five-point scale

where 5 stood for excellent, 4 for good, 3 for average, 2 for poor, and 1 for very poor:



Comparative Test

- colour and appearance (the colour of jam should be reasonably uniform and a characteristic red; it should be free from any blackening of surface or any discolouration)
- aroma/flavour (the jam should have an appealing flavour)
- texture
- taste and aftertaste feeling, and
- overall acceptability.

The average score for each parameter was taken into consideration to arrive at the final score for each brand.

- Mala's topped in the overall sensory scores, followed by Cremica and Safal.*

Total Sensory Scores

Brand	Score out of 15
Mala's	11.96
Cremica	11.34
Safal	10.91
Easy Maxx	10.38
Mum's	10.35
Mapro	10.35
Tops	10.14
Kissan	9.86
Mrs Food Rite	9.83
Sil	9.47
Druk	9.38
Tasty Treat	8.81
Reliance Select	8.42



Parameter ↓	Weightage (%)	Cremica	Mapro	Mum's	Tops	Sil	Mrs Food Rite	Easy Maxx	Druk
Net weight	3	2.7	3	3	3	3	3	3	3
Marking	3	3	3	3	3	2.8	3	3	2.8
Packaging	2	2	2	2	2	2	2	2	2



Net weight | Marking | Packaging

Net weight: The weight of the jam was measured and compared with the declared values on their packaging. All the 13 brands of jams tested had declared their net weight as 480/500/700 gm. When we weighed them under laboratory conditions, we found that most of them actually weighed more than the quantity declared on the label. Safal and Cremica had slightly less weight than the declared value but were well within the limit.

Marking: Each packet of milk should be marked/labelled with these particulars:

- a) Name of the product with the brand name, if any
- b) Indication of the source of manufacture
- c) Net content in grams
- d) Month and year of manufacture
- e) Batch or code number, if any
- f) List of ingredients in descending order
- g) List of additives, if used
- h) Best before (month/year)
- i) Manufacturing license number;
- j) Other marking as required under Legal Metrology (Packaged Commodities) Rules, 2011
- k) MRP
- l) 'Green dot' to denote vegetarian food

All brands provided all required information on their pack.

Packaging: The product shall be packed either in glass bottles or in hermetically sealed, sanitized cans made from tinplates that are inside lacquered or in food-grade plastic containers or aseptic packages, preferably having tamper-proof provision.

All the 13 brands we tested were in glass bottles.

	Safal	Reliance Select	Kissan	Mala's	Tasty Treat
	2.75	3	3	3	3
	3	2.8	3	3	3
	2	2	2	2	2

FAQs

How to tell if your jam is bad, rotten or spoiled?

The first sign of caution with most jams is when a liquid begins to form on the top of the product. It goes downhill quickly from there as the consistency becomes thicker and the colour becomes darker. Then it can develop an unpleasant odour, which is almost always followed by an unpleasant flavour and then mould. Once there is any mould at all present, the entire jar must be tossed. Mould spreads very quickly in a soft environment like jam or jelly, whether you can see it on the bottom of the jar or not. Mould spores that can cause serious illness can spread quickly and easily through the entire jar.

It's a good idea to put a label on the product indicating the date it was opened, and, before consuming, to examine it carefully for evidence of deterioration, especially mould.

How to store the jam to extend its shelf life?

All preserved fruits should be stored in a cool dry environment not susceptible to temperature change. When items go through temperature changes of cool to warm and vice versa, the moisture in the air tends to condensate inside the packages. This moisture allows mould to grow and your jam to spoil. You should always make sure to use clean utensils when serving jams in order to avoid cross-contamination. Normally, there is no need to store jams in a fridge. They should be stored in a cool, dry, airy place.

How long is jam good for when prepared in a dish?

That depends. In general, jam lasts only as long as the quickest expiring ingredient it is mixed with.

